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Topical Minocycline as treatment for Acne Vulgaris

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ABSTRACT

Objective: Evaluate the efficacy and safety of 4% topical minocycline in treating moderate-to-severe acne vulgaris (AV). *Methods:* A prospective single arm clinical study than involved 50 patients with moderate-to-severe acne, the patients were followed up for 12 weeks from baseline and was give once daily minocycline 4% topical treatment. The coprimary end points at week 12 were the absolute change in inflammatory lesion counts from baseline and the rates of Investigator's Global Assessment (IGA)-assessed treatment success, which was defined as an IGA score of 0 or 1 (description of clear or almost clear) plus at least a 2-grade improvement from baseline. Other end points included the absolute change from baseline in noninflammatory lesion count at week 12. *Results*: The study included 50 patients with moderate – severe lesions (4:1 ratio), with the majority female participants, mean age was 21.5 ± 4.7 years. In the present study there was significant reduction in both mean count of inflammatory and non-inflammatory lesions after 12 weeks of follow-up (-27.5 and -30, respectively) with 16% of the patients achieved treatment success according to IGA score. *Conclusions:* The once daily use of topical minocycline 4% for 12 weeks result in improvement in both inflammatory and non-inflammatory lesion, and improvement in investigator global assessment. In term of safety this product offers very few adverse events.

Keywords: minocycline, topical, inflammatory lesions, non-inflammatory lesions

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1. INTRODUCTION

Acne vulgaris (AV) is a common chronic inflammatory skin disorder involving pilosebaceous follicles (Biswal et al., 2016; Pena et al., 2016). It typically affects adolescents and young adults; however, acne can occur in any age group and persist into adulthood (Jones et al., 2017; Zaenglein et al., 2016). It most commonly affects the face and trunk and is characterized by papules, pustules, and comedones, and is frequently associated with scarring (Mendoza et al., 2013; Thiboutot et al., 2018).

AV pathogenesis is believed to be multifactorial, involving overproduction of sebum, colonization by Cutibacterium acnes (C. acnes) within pilosebaceous follicles, follicular hyperkeratosis, and inflammation (Odsbu et al., 2017). Factors secreted by C. acnes, which includes several enzymes that can generate active oxygen species (free radicals), these cause cellular damage and induce inflammatory response. Furthermore, AV is associated with

significant physical and psychological comorbidity, such as pain, scarring, depression, anxiety, and low self-esteem (Gold et al., 2019).

Tetracyclines are one of the best options for treating moderate-to-severe AV (Mendoza et al., 2013; Zaenglein et al., 2016). A topical preparation of minocycline is available as therapeutic option which offer the full antimicrobial effect with minimum systemic side effect, this new topical preparation of minocycline have been previously unsuccessful, until the recent approval of the first topical minocycline, FMX101 4% foam, for the treatment of inflammatory lesions of non-nodular moderate-to-severe AV in patients nine years of age or older. The objective of the current work is to evaluate the efficacy and safety of FMX101 4% in treating moderate-to-severe acne vulgaris.

2. PATIENTS AND METHODS

Study design and setting

A prospective single arm clinical study than involved 50 patients with moderate-to-severe acne, the patients were followed up for 12 weeks from baseline, and was give once daily minocycline 4% topical treatment. The coprimary end points at week 12 were the absolute change in inflammatory lesion counts from baseline and the rates of Investigator's Global Assessment (IGA)-assessed treatment success, which was defined as an IGA score of 0 or 1 (description of clear or almost clear) plus at least a 2-grade improvement from baseline. Other end points included the absolute change from baseline in noninflammatory lesion count at week 12.

Study settings

The study carried out in a private outpatient clinic during the period from August 2019 to June 2020, in the department of dermatology, Basrah, Iraq.

Inclusion criteria

Male or female individuals age 9 years or older were eligible if they had moderate-to-severe facial acne, as defined by an Investigator's Global Assessment (IGA) score.

Exclusion criteria

Pregnant women and use of oral and typical retinoids or corticosteroids within 12 weeks before treatment

IGA score scale

The following represent the grade for IGA score: [0] clear, [1] almost clear, [2] mild, [3] moderate, [4] severe, and [5] very severe.

Statistical analysis

For continuous variable Wilcoxon median ranked test was to assess the change from baseline till 12 weeks of follow-up, while number of percentages used to describe the categorical variables, all analysis carried out using SPSS version 23.1, p-value considered significant if <0.05.

3. RESULTS

The study included 50 patients with moderate – severe lesions (4:1 ratio), with the majority female participants, mean age was 21.5 ± 4.7 years, as illustrated in table 1.

Table 1 assessment of demographical and baseline data of the patients

Variables	Value
Number	50
Age (years), mean ± SD	21.5 ± 4.7
Gender	
Female	32 (64%)
Male	18 (36%)
Mean inflammatory lesions count, median (IQR)	36.1 (22 – 57)
Mean non-inflammatory lesions count, median (IQR)	53.8 (30 – 110)

IGA score, n (%)	
3 (moderate)	40 (80%)
4 (severe)	10 (20%)

There was significant reduction in mean inflammatory and non-inflammatory lesions count after 12 weeks of follow-up; in addition 16% achieved treatment success according to IGA score, as illustrated in table 2 and figure 1.

Table 2 assessment of outcomes of the study

	Baseline	12 weeks	Mean change	p-value
Mean inflammatory lesions count, median (IQR)	36.1 (22 – 57)	8.6 (4 – 19)	-27.5	<0.001
Mean non-inflammatory lesions count, median (IQR)	53.8 (30 – 110)	23.8 (11 – 47)	-30.0	<0.001
Proportion of subjects achieving treatment success according IGA	-	8 (16%)	-	-

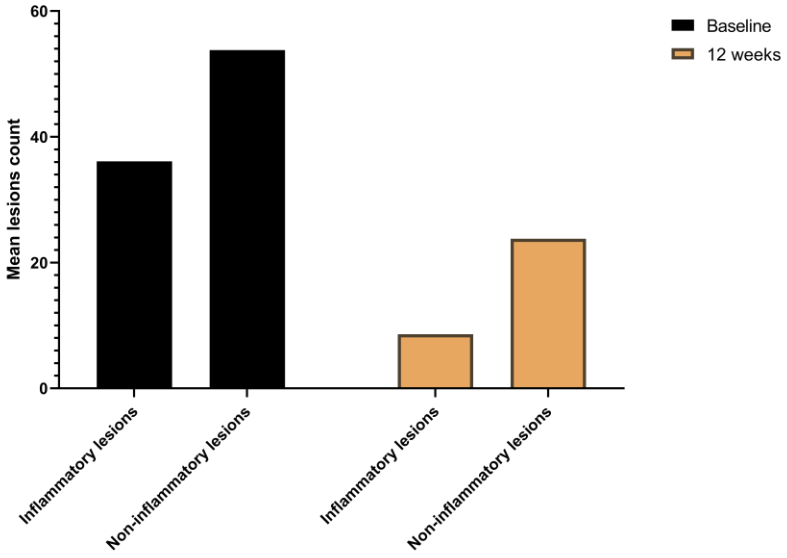

Figure 1 assessment of outcomes of the study

Table 3 the adverse effect profile during the study

Side effect	Value
Headache	2 (4%)
Nasopharyngitis	2 (4%)
Skin discoloration	2 (4%)
Local swelling	1 (2%)
Burn sensation	2 (4%)

4. DISCUSSION

Extensive clinical evidence supported the use of the oral minocycline as a first-line therapy for patients with moderate-to-severe acne (Garner et al., 2012; Zaenglein et al., 2016). Nonetheless, there are still legitimate concerns with systemic adverse events associated with this route of administration (Zaenglein et al., 2016). A topical formulation of minocycline was expected to confer the advantages of facilitated local application and enhanced bioavailability while providing the drug's proven high efficacy in acne, all with less systemic toxicity than observed with its oral counterpart. Indeed, once-daily topical application of 4% minocycline foam for up to 21 days did not result in significant systemic exposure to minocycline or its accumulation (Jones et al., 2017).

In the present study there was significant reduction in both mean count of inflammatory and non-inflammatory lesions after 12 weeks of follow-up (-27.5 and -30, respectively) with 16% of the patients achieved treatment success according to IGA score. Our findings were in agreement with previous studies. In these studies, the once-daily application of 4% minocycline for 12 weeks was significantly more effective than vehicle in reducing inflammatory and noninflammatory lesions in both studies. Historical reports showed a 43% to 46% reduction of inflammatory lesions at 12 weeks from baseline with oral minocycline, in comparison with a reduction of 43% to 44% with 4% minocycline foam (Solodyn, 2016). Notably, minocycline 4% appeared to provide a rapid onset of efficacy, with significant reductions of the inflammatory lesions observed as early as week 3 and maintained until the end of treatment (Gold et al., 2019).

Headache, which is a common adverse effect (AE), with few overall side effects reported by the patients indicating a high safety profile, which in agreement with previous studies (Gold et al., 2019; Garner et al., 2012).

5. CONCLUSION

The once daily use of topical minocycline 4% for 12 weeks result in improvement in both inflammatory and non-inflammatory lesion, and improvement in investigator global assessment. In term of safety this product offers very few adverse events.

Author contribution

Firas Fakhir Altameemi: Conception and design of the work, the acquisition, analysis, and interpretation of data for the work, and Drafting the work.

Oday Sajjad Alsawad: Conception and design of the work, the acquisition, analysis, and interpretation of data for the work, and Drafting the work.

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Conflict of Interest

The authors declare that they have no conflict of interest.

Informed consent

Written informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

Ethical approval for human

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards (Code: 2020/A081).

Data and materials availability

All data associated with this study are present in the paper.

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